

Claims

1. A combined long and short distance wireless communication system comprising:

5 a dual distance terminal for providing subscribers with long and short distance communication services;

at least one remote distance base station for providing remote distance wireless access for said dual distance terminal;

10 at least one short distance access point (AP) for providing short distance wireless access for said dual distance terminal; and

a dual distance network server for connecting said at least one remote distance base station through said at least one short distance AP to execute network switching for said dual distance terminal and enabling said dual distance terminal to access the network to which it is switched.

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2. The wireless communication system according to claim 1, wherein said at least one remote distance base station comprises a plurality of long distance communication network devices associated with said remote distance base stations.

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3. The wireless communication system according to claim 1, wherein said short distance access point comprises a plurality of short distance communication network devices associated with said short distance access points.

25 4. A dual distance server used for a combined long and short distance wireless communication system as claimed in claim 1, comprising:

a data service function entity for detecting whether or not the occurrence of a long and short distance data transmission is, if it is, then providing a connection service for said data transmission;

5 a memory function entity for storing data that may be missed at the time of switching, and sending the stored data to a terminal via said data service function entity after said terminal switching is completed, in order to implement seamless switch for the terminal between a long distance communication network and a short distance communication network;

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a dual distance home server for registering the dual distance character parameters of the dominated dual distance terminals, obtaining terminal switch information via said data service function entity when dual distance switch occurs, updating the terminal data; and informing said data service function entity of
15 terminal-related dual distance information when a query regarding the terminal exists;

an external network interface unit for connecting dual distance network and an interface of an external network.

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5. The dual distance server according to claim 4, wherein said external network interface comprises a wireless interface, an interface for wire network, and an interface for other wireless networks.

25 6. A dual distance terminal used for a combined long and short distance wireless communication system as claimed in claim 1, comprising:

a short distance communication function entity having a short distance radio frequency function module for functioning as physical layer, part of MAC layer or link layer and operating in a short distance communication network to obtain data information;

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a long distance communication function entity having a long distance radio frequency function module for functioning as physical layer and part of link layer;

10 a network switch condition judging function entity for performing network switching for the dual distance terminal based on the corresponding dual distance switch condition and instructing the short distance communication function entity or the long distance communication function entity to send a beacon signal to the dual distance network server;

15 a common function entity for implementing display and input and output functions of the terminal.

20 7. The dual distance terminal according to claim 6, wherein said dual distance terminal further comprise a data management and buffering function entity for storing data which is missed during the switch and forwarding the stored data to the common function entity which is a higher level of the terminal after the switch is completed.

25 8. A wireless communication method using combined long and short distance wireless communication systems, comprising steps:

detecting a dual distance terminal to determine whether it is located in a service area covered by a short distance access point upon powering on;

entering a short distance communication network through the short distance access point if the dual distance terminal is located within the service area covered by the short distance access point, and informing a dual distance home server of the position of the dual distance terminal;

5 searching for a base station for a long distance communication service if the dual distance terminal is not located in the area covered by any one of the short distance access points, entering a long distance communication network through a long distance access network, and informing the dual distance home server of the position of the dual distance terminal.

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9. The wireless communication method according to claim 8, further comprising the steps of if the dual distance terminal detects that a wireless local area network (WLAN) exists and does not require authority identification at present, the dual distance terminal then accesses the WLAN network directly; if the result of the
15 detection indicates that current WLAN network requires authority identification, the dual distance terminal then performs access authority identification via WLAN network; and if the authority identification is successful, the dual distance terminal accesses current WLAN network; the dual distance terminal continues the detection and enters into the long distance GPRS communication network if the authority
20 identification is unsuccessful.

10. The wireless communication method according to claim 9, further comprising the step of the dual distance terminal performs data transmission by accessing the dual distance server via the short distance WLAN network after the
25 dual distance terminal enters into the WLAN network.

11. The wireless communication method according to claim 9 or 10, further comprising the steps of switching from the short distance communication network to

the long distance communication network immediately before the dual distance terminal moves out of the short distance WLAN network and enters into the GPRS network; the dual distance terminal makes judgment by using switching conditions, if a predetermined threshold for the switching is satisfied, the dual distance terminal
5 terminates data transmission through a short distance radio frequency function entity with the switching conditions, and activates a long distance communication function entity and uses it to implement the possible sequent data transmission.

12. The wireless communication method according to claim 11, wherein the
10 threshold for the switching condition is a non-usable threshold of a short distance communication network signal or a non-optimal threshold of a short distance communication network signal.

13. The wireless communication method according to claim 11, wherein during
15 the process of switching from the short distance communication network to the long distance communication network, if the dual distance terminal requests seamless switching based on its service level, the dual distance terminal terminates data transmission through the short distance radio frequency function entity and sends a beacon signal for switching between the short distance communication network and
20 the long distance communication network to the short distance AP from which is switched through the short distance communication function entity in the terminal while it terminates the data being transmitted by the WLAN radio frequency function entity, the beacon signal is then transmitted to the dual distance network server by the short distance AP; after receiving the corresponding beacon signal, the dual
25 distance network server informs the long distance communication function entity to be accessed by the dual distance terminal of the receipt, and determines the service queue position which the dual distance terminal is arranged in the long distance network function entity based on its service level.

14. The wireless communication method according to claim 13, wherein the dual distance communication network server stores the data packets which may be missed in the switching process to protect the data packets, the stored data packets are forwarded to the dual distance terminal after the switching is completed,
5 preventing data for the dual distance terminal from lost during the switching.

15. The wireless communication method according to claim 8, further comprising the steps of switching from the long distance communication network to the short distance communication network immediately before the dual distance
10 terminal moves out of the long distance communication network and enters into the short distance WLAN network; the dual distance terminal makes judgment by using switching conditions, if a predetermined threshold of the switching is satisfied, the dual distance terminal terminates data transmission through a long distance radio frequency function entity with the switching conditions, and activates a short
15 distance communication function entity and uses it to implement the possible sequent data transmission.

16. The wireless communication method according to claim 15, wherein if the dual distance terminal requests seamless switching from the long distance
20 communication network to the short distance communication network based on its service level, when terminating the data being transmitted by the long distance communication function entity, the dual distance terminal further sends one beacon signal of long and short distance switching to the long distance service function entity from which is switched through the base station and the long distance network
25 function entity in the dual distance terminal, the beacon signal is transmitted to the dual distance network server by the long distance network function entity, and after receiving the corresponding beacon signal, the dual distance network server informs the short distance communication function entity of the receipt, and

determines the priority of the dual distance terminal in the short distance communication network function entity based on its service level.

17. The wireless communication method according to claim 16, further
 5 comprises the dual distance communication network server stores the data packets which may be missed in the switching process to protect the data packets, the stored data packets are forwarded to the dual distance terminal after the switching is completed, thereby preventing data for the dual distance terminal from lost during the switching.

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18. The wireless communication method according to claim 9 or 10, wherein when the dual distance terminal moves from one short distance cell to another short distance cell, the dual distance terminal identifies the short distance AP to which it enters, and sends the cell information to the dual distance network server, thereby
 15 implementing the switching between the short distance cells.

19. The wireless communication method according to claim 18, further comprises the step of when one dual distance terminal moves from one short distance cell to another short distance cell, the dual distance terminal informs the
 20 home server among the dual distance network servers that it has already entered in the area covered by said another short distance communication network, and the home server is in charge of the query and communication to it from the other terminals in the network.

20. The wireless communication method according to claim 8, wherein said
 25 dual distance terminal detects the long and short distance communication networks in the manner of scanning with one of the following three ways:

(1) the dual distance terminal keeps the long distance and the short distance radio frequency entity in operating state all the time, and detects the possible long distance or short distance communication network environment in real-time, continuously feeds the detected results back to the dual distance terminal switching management mechanism, the detected results are reported to the dual distance network server through the existing network periodically or as desired;

(2) the dual distance terminal keeps the radio frequency function entity corresponding to the network in which it locates in operating state all the time, and activates the radio frequency function entities for the other networks periodically or non-periodically to detect the candidate networks;

(3) the dual distance terminal keeps the radio frequency function entity in the network in which it locates in operating state all the time, and does not scan and detect the other networks until the existing network is not available.

21. The wireless communication method according to claim 20, wherein the detection for candidate networks with non-periodically activating the corresponding radio frequency function entity is carried out by using a viable-step detection method which the time interval of finally finding the occurrence of other networks is used as a function.

22. The wireless communication method according to claim 11, wherein said switching conditions comprising two types of as follows:

(1) the dual distance terminal switches to the network with higher priority level as long as the network with higher priority level is detected;

(2) The dual distance terminal switches to other networks only when the currently used wireless network signals can not be received.

23. The wireless communication method according to claim 15, wherein said
5 switching conditions comprising two types of as follows:

(1) the dual distance terminal switches to the network with higher priority level as long as the network with higher priority level is detected;

(2) The dual distance terminal switches to other networks only when the currently used wireless network signals can not be received.

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24. The wireless communication method according to claim 18, wherein said switching conditions comprising two types of as follows:

(1) the dual distance terminal switches to the network with higher priority level as long as the network with higher priority level is detected;

15 (2) the dual distance terminal switches to other networks only when the currently used wireless network signals can not be received.

25. The wireless communication method according to any one of claims 22-24, wherein the switching condition which the dual distance terminal switches to other
20 networks only when the currently used wireless network signals can not be received means that only when the wireless network in which the dual distance terminal is located is not available, the dual distance terminal performs switch, and if the network which the dual distance terminal currently located is available, the switch is not performed even though there are networks with a higher priority levels.

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26. The wireless communication method according to claim 8, wherein when the dual distance terminal moves from one network to another network, the dual distance server cooperates with the dual distance terminal to perform the switch.

5 27. The wireless communication method according to claim 26, wherein the process of the dual distance server cooperating with the dual distance terminal to perform the switch comprises:

first step: detecting the dual distance beacon signal of the dual distance terminal by the long (or short) distance network function entity, checking whether a
10 switching occurs, if it is not, then the detection is repeated; if it is yes, the flow turns to next step;

second step: updating the subscriber information registered in the dual distance home register;

third step: determining whether or not data transmission occurs, if it is not, the
15 flow returns to the first step;

fourth step: determining whether or not there exists a need for seamless switching, if it is not, the flow returns to the first step;

fifth step: buffering the transmitted data, and forwarding the buffered data to the dual distance terminal after the switch is completed.

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28. The wireless communication method according to claim 15, wherein when the dual distance terminal located in the long distance network requests to enter any one of the service areas covered by the short distance APs, if the AP within the area rejects the access of the dual distance terminal due to security or other issues, then
25 the dual distance terminal still operates the long distance communication.

29. The wireless communication method according to claim 8, wherein the subscriber may define the priority levels of the switching in advance as desired so that the dual distance terminal performs automatic switching.